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Yih-Liang Lu

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LOWE HAUPTMAN BERNER, LLP
1700 DIAGONAL ROAD
SUITE 300
ALEXANDRIA, VA 22314

EXAMINER

NADKARNI, SARVESH J

ART UNIT

PAPER NUMBER

2609

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/810,621

Applicant(s)

LU ET AL.

Examiner

Sarvesh J. Nadkarni

Art Unit

2609

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1, 5-8 and 12-18 is/are rejected.
- 7) ☒ Claim(s) 2-4, and 9-11 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, all steps of **claim 1 including steps 4 and 5** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. **Claim 1** is objected to because of the following informalities: the elements “original gamma curve”(page 11, line 4), “luminance corresponding to the target gamma curve” (page 11, line 6), “adjusted gray level” (page 11, line 7), “luminance from the original gamma curve” (page 11, lines 7-8), “quantity distribution” (page 11, line 14), “dark level proportion” (page 11, line 15), “bright level proportion” (page 11, lines 15-16), “lookup table of dark levels” (page 11, line 18), “the lookup table of bright levels” (page 11, line 21), and “signal intensity” (page 11, line 23) are not introduced using proper antecedent basis format; articles “a” or “an” is used to introduce an element whereas, “the” or “said” is used to refer to a previously introduced element or step. Appropriate correction is required.

1. As an additional example, in **Claim 8** the elements “dark level proportion”, “bright level proportion”, “dark level lookup table”, “bright level lookup table” and “adjusted gray levels” are not introduced using proper antecedent basis format; articles “a” or “an” is used to introduce an element whereas, “the” or “said” is reserved to reference previously introduced elements or steps. Appropriate correction is required.

2. Additionally, **Claims 2-7 and 9-18** are also objected to for elements lacking antecedent basis. Appropriate formatting is required as described above.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. **Claims 5, 6, 12, 13, and 17** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In **Claims 5, 12 and 17**, the phrase “i.e.” is used; however, the disclosure fails to exactly explain or adequately describe what “i.e.” means. Furthermore, use of the phrase renders the claims indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP 2173.05(d). **Claims 6 and 13** are also rejected because they depend on rejected **claims 5 and 12**, respectively.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claim 15** is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Clifton, et al., United State Patent Number 6,043,797, dated March 28, 2000 (hereinafter referred to as Clifton ‘797).

7. With regard to **Claim 15**, Clifton ‘797 discloses a method of luminance compensation of a liquid crystal display (see column 2, lines 48-50, “a method that correct luminance and color balance of a liquid crystal projection display”) including the following steps:

(1) measuring the original gamma curve of a panel; (Column 7, line 15

“measuring the S-curve response”; see also FIG. 7, element 90)

(2) setting a target gamma curve; (Abstract, lines 3-5, “storing multiple sets of gain and or gamma corrected responses 92-99”; see also FIG. 7, elements 92-99; and further described in column 8, lines 11-21)

(3) imputing an initial gray level to obtain the luminance corresponding to the target gamma curve, (Column 7, lines 41, “input data value 175”; see also FIG. 7) and finding the adjusted gray level for expressing the luminance from the original gamma curve; (Column 7, lines 54-57, “[processor] determines from gamma corrected response 92 that the gamma corrected luminance value is about 0.42, accesses the stored set of luminance values for S curve 90, and determines the corrected data value 130 corresponds to luminance value 0.42.”; see also, FIG. 7)

(4) repeating (2) and (3) steps to produce plural groups of initial gray levels and plural groups of adjusted gray levels, and combining the plural groups of adjusted gray levels into a proportion array; (column 7, lines 58-62, “The processor then loads corrected data value 130 into a lookup table at an address location 175. This process is repeated for each input data value until the lookup table stores a corrected data value for each possible input data value.”; see also FIG. 7)

and (5) repeating (2), (3), and (4) steps to produce plural groups of proportion arrays and make a lookup table from different target curves; (column 8, lines 12-17, “the processor uses each of gain and gamma corrected responses 93-99 to load corresponding corrected data value into the lookup table for each input data value until the lookup table stores a corrected data value for each input data value and for each of gain and/or gamma

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corrected responses 92-99. The different sets of corrected data value may be accessed from the lookup table by conventional address offsetting..."; see also FIG. 7) whereby the method being able to adjust the intensity of the input signals and obtain better image quality.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. **Claims 1 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Clifton et al. United States Patent Number 6,043,797, date of patent March 28, 2000 (hereinafter referred to as Clifton '797), and further in view of Leyvi et al. United States Patent Application

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Publication Number 2006/0071936, PCT filing date November 12, 2003 (hereinafter referred to as Leyvi).

4. With regard to **Claim 1**, Clifton '797 discloses a method of luminance compensation of a liquid crystal display including the following steps:

(1) measuring the original gamma curve of a panel; (Column 7, line 15 "measuring the S-curve response"; see also FIG. 7, element 90)

(2) setting a target gamma curve; (Abstract, lines 3-5, "storing multiple sets of gain and or gamma corrected responses 92-99"; see also FIG. 7, elements 92-99)

(3) imputing an initial gray level to obtain the luminance corresponding to the target gamma curve, (Column 7, lines 41, "input data value 175"; see also FIG. 7) and finding the adjusted gray level for expressing the luminance from the original gamma curve; (Column 7, lines 54-57, "[processor] determines from gamma corrected response 92 that the gamma corrected luminance value is about 0.42, accesses the stored set of luminance values for S curve 90, and determines the corrected data value 130 corresponds to luminance value 0.42."; see also, FIG. 7)

(4) repeating (2) and (3) steps to produce plural groups of initial gray levels and plural groups of adjusted gray levels, and combining the plural groups of adjusted gray levels into a proportion array; (column 7, lines 58-62, "The processor then loads corrected data value 130 into a lookup table at an address location 175. This process is repeated for each input data value until the lookup table stores a corrected data value for each possible input data value."; see also FIG. 7) and

(5) repeating (2), (3), and (4) steps to produce plural groups of proportion arrays and make a lookup table from different target curves; (column 8, lines 12-17, “the processor uses each of gain and gamma corrected responses 93-99 to load corresponding corrected data value into the lookup table for each input data value until the lookup table stores a corrected data value for each input data value and for each of gain and/or gamma corrected responses 92-99. The different sets of corrected data value may be accessed from the lookup table by conventional address offsetting...”; see also FIG. 7).

5. However, Clifton ‘797 fails to disclose **steps 6-10 of claim1**.

6. Leyvi clearly teaches the following:

(6) calculating the quantity distribution of input gray levels of images (On page 2 paragraph 0025, Leyvi describes a “threshold circuit” that “measures a number of ‘dark’ pixels, a number of ‘white’ pixels, and a number of ‘gray’ pixels”)

(7) respectively calculating the dark level proportion and the bright level proportion (the threshold circuit further “generates a dark number signal 252” and “a white number signal 253”);

(8) selecting a corresponding proportion array according to the value of dark level proportion from the lookup table of dark levels and substituting the adjusted gray level in the proportion array for the input gray level (on page 2 paragraph 0027, Leyvi explains the operation of a “decision and brightness adjustment circuit” which uses the dark number signal 252 to adjust the brightness of the frame using a lookup table);

(9) selecting a corresponding proportion array according to the value of bright level proportion from the lookup table of bright levels and substituting the adjusted gray

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level in the proportion array for the input gray level (on page 2 paragraph 0027, Leyvi explains the operation of a “decision and brightness adjustment circuit” which uses the white number signal 253 to adjust the brightness of the frame using a lookup table); and

(10) outputting the adjusted gray levels (in claim 13, on page 5-6, Leyvi discloses outputting local brightness adjusted video signal wherein the video signal has adjusted selected grey-levels of a pixelated frame);

whereby the method being able to adjust the input signal intensity and obtain better image quality (Leyvi describes improved image quality. Leyvi describes improved contrast at but not limited to the title of the application; improving contrast is fundamental to improved image quality).

7. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have been motivated to incorporate Leyvi’s method of measuring input grey scales values and outputting adjusted grey levels into the method of building lookup tables as described by Clifton ‘797 because Leyvi clearly discloses the use of lookup tables as a method of measuring and storing the output adjusted gray levels, one such incorporation of these tables including those created by the method disclosed in Clifton ‘797.

8. With regard to **claim 7**, and as applied to **claim 1**, it is obvious to one having ordinary skill in the art at the time of invention to use interpolation to determine the gray levels between the adjusted gray levels. Interpolation is a known method of graphical analysis and is commonly applied in the art to determining gray level values.

9. **Claim 8 and 14** is rejected under 35 U.S.C. 103(a) as being unpatentable over Leyvi et al. United States Patent Application Publication Number 2006/0071936, PCT filing date

November 12, 2003 (hereinafter referred to as Leyvi). With regard to **Claim 8**, Leyvi discloses a method for luminance compensation of liquid crystal display including the following steps:

(1) calculating the quantity distribution of input gray levels of images (On page 2 paragraph 0025, Leyvi describes a “threshold circuit” that “measures a number of ‘dark’ pixels, a number of ‘white’ pixels, and a number of ‘gray’ pixels”)

(2) respectively calculating the dark level proportion and the bright level proportion (the threshold circuit further “generates a dark number signal 252” and “a white number signal 253”);

(3) selecting a corresponding proportion array according to the value of dark level proportion from the lookup table of dark levels and substituting the adjusted gray level in the proportion array for the input gray level (on page 2 paragraph 0027, Leyvi explains the operation of a “decision and brightness adjustment circuit” which uses the dark number signal 252 to adjust the brightness of the frame using a lookup table);

(4) selecting a corresponding proportion array according to the value of bright level proportion from the lookup table of bright levels and substituting the adjusted gray level in the proportion array for the input gray level (on page 2 paragraph 0027, Leyvi explains the operation of a “decision and brightness adjustment circuit” which uses the white number signal 253 to adjust the brightness of the frame using a lookup table); and

(5) outputting the adjusted gray levels (in claim 13, on page 5-6, Leyvi discloses outputting local brightness adjusted video signal wherein the video signal has adjusted selected grey-levels of a pixelated frame).

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10. With regard to **claim 14**, and as applied to **claim 8**, it is obvious to one having ordinary skill in the art at the time of invention to use interpolation to determine the gray levels between the adjusted gray levels. Interpolation is a known method of graphical analysis and is commonly applied in the art to determining gray level values.

11. With regard to **claims 1, 7, 8, and 14**, Official notice is taken of the fact that it is notoriously old and well known in the display art to modify the parameters of memory and storage components during the course of routine optimization/experimentation. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have had a plurality of look up table designations so as to reference or access information within memory or storage device. The rationale is as follows:

12. One of ordinary skill in the art would have been motivated to have had a plurality of look up table designations so as to reference or access information within memory or storage device since such practice, absent any criticality (i.e., unobvious and/or unexpected result(s)), is generally achievable through routine optimization/experimentation, and since discovering an optimum or workable solution, where the general conditions of a claim are disclosed in the prior art, involves only routine skill in the art, *In re Aller*, 105 USPQ 233 (CCPA 1955). Moreover, in the absence of any criticality (i.e., unobvious and/or unexpected results(s)), the parameter set forth above would have been obvious to a person having ordinary skill in the art at the time the invention was made, *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

13. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over Stessen, United States Patent Number 6,781,636 B2, date of filing Mar. 9, 2001 (hereinafter referred to as

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Stessen '636) and further in view of Ito, United States Patent Number 6,856,306 B2, date of filing June 24, 2002, (hereinafter referred to as Ito '306).

14. With regard to **claim 16**, Stessen '636 discloses a device for luminance compensation of liquid crystal display including:

A histogram extraction for receiving image signals (Stessen '636 discloses luminance signals at column 1, line 28) and counting the quantity distribution of each input gray level to obtain the distribution state of the gray level; (Stessen '636 discloses a histogram modification means in which, first the distribution function of the brightness levels of a representative number of pixels, i.e., a histogram, is measured" at column 1 lines 33-35), and

a lookup table storage unit for storing a lookup table; (Stessen '636 describes a "memory with a look-up table (LUT)" at column 1, line 44).

whereby the intensity of the input signals being able to be adjusted and better image quality being able to be obtained. (Stessen '636 discloses that the histogram modification means performs contrast enhancement and creating better brightness levels of black and white, a key element in image quality)

15. However, Stessen '636 fails to disclose the gray level operation unit for calculating a gray level proportion and establishing the output value.

16. Ito '306 discloses:

a gray level operation unit (Ito '306 describes a "display data processing circuit" at column 2, line 49 and further describes its components, a "storing section" column 2, line 50, a "processing section" at column 2, line 54, and a "table section" at column 2,

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line 62) for calculating the gray level proportion (gray level proportion is described in Ito '306 as "a ratio of grey scale value of input display data to a number of gray scale levels of the input display" at column 2 lines 50-53), taking the gray level proportion into a transfer function to get LUT intensity (Ito '306 describes an "arithmetic operation on a power value of an integral portion of the coefficient setting value of a ratio of the gray-scale value of input display data to a number of gray-scale levels of the input display data", see column 2, lines 58-61) which corresponds to the proportion array in the lookup table (the table section stores "the value obtained by multiplication performed by the processing section which corresponds to all gray-scale values that the input display data is able to take on") , substituting the adjusted gray levels in the proportion array for the input gray levels, and outputting the adjusted gray levels (Ito '306 describes "converting the input display data to a gray scale value of output display data" and then "reading the data" as an output at column 2 through line 64 through column 3 line 3, see generally FIG. 3A and 3B).

Note: Ito '306 also uses a look-up table as shown in FIG. 3A and 3B and is further described in column 6 lines 12-15 and generally depicted as element 3 in the figures.

17. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the histogram extraction and look-up table as described in Stessen '636 with the gray level operation unit as describe in Ito '306 because, as Ito explains, use of his invention would reduce power consumption and reduce the need for additional memory, (see column 2, lines 44-46), of which both features are desirable goals within the art.

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18. With regard to **Claim 17**, and as applied to **Claim 16**, Ito '306 describes a gradually increasing transfer function labeled "Equation (2)" in column 6, lines 15-20. As stated above, there is motivation to combine these references.

19. With regard to **Claim 18**, and as applied to **Claim 16**, it is obvious to one having ordinary skill in the art to use interpolation to determine the gray levels between the adjusted gray levels.

Allowable Subject Matter

20. **Claims 2-4** are objected to as being dependent upon a rejected base claim, **claim 1**, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. The following are statements of reasons for the indication of allowable subject matter:

With regard to **claim 2** and as applied to **claim 1**, neither Clifton '797 nor Leyvi teaches that the dark level proportion is the ratio of the gray level quantity in dark level interval to the total gray level quantity, and the range of the dark level interval is from below a specific value in the total gray level range; the bright level proportion is the ratio of the gray level quantity in bright level interval to the total gray quantity, and the range of the bright level interval is from above a specific value in the total gray level range.

With regard to **claim 3** and as applied to **claim 1**, neither Clifton '797 nor Leyvi teaches the range of the dark level interval is the front quarter of the total

gray level range; the range of the bright level interval is the rear quarter of the total gray level range.

With regard to **claim 4** and as applied to **claim 1**, neither Clifton '797 nor Leyvi teaches that the dark level lookup table consists of a plurality of input gray levels and plural groups of proportion arrays, each input gray level can correspond to an adjusted gray level in proportion array; the bright level lookup consists of a plurality of input gray levels and plural groups of proportion arrays, each input gray level can correspond to an adjusted gray level in proportion array.

22. **Claims 9-11** are objected to as being dependent upon a rejected base claim, **claim 8**, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

23. The following are statements of reasons for the indication of allowable subject matter:

With regard to **claim 9** and as applied to **claim 8**, Leyvi fails to teach that the dark level proportion is the ratio of the gray level quantity in the dark level interval to the total gray level quantity, and the range of the dark level interval is from below a specific value in the total gray level range; the bright level proportion is the ratio of the gray level quantity in the bright level interval to the total gray level quantity, and the range of the bright level interval is from above a specific value in the total gray level range.

With regard to **claim 10** and as applied to **claim 8**, Leyvi fails to teach that the range of the dark level interval is the front quarter of the total gray level range;

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the range of the bright level interval is the rear quarter of the total gray level range.

With regard to **claim 11** and as applied to **claim 8**, Leyvi fails to teach that the dark level lookup table consists of a plurality of input gray levels and plural groups of proportion arrays, each input gray level can correspond to an adjusted gray level in the proportion array; the bright level lookup table consists of a plurality of input gray levels and plural groups of proportion arrays, each input gray level can correspond to an adjusted gray level in the proportion array.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarvesh J. Nadkarni whose telephone number is 571-270-1541. The examiner can normally be reached on 8:00-5:00 M-Th EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on 571-273-1550. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SN


AMARE MENGISTU
SUPERVISORY PATENT EXAMINER